THE CÆCAL FOLDS AND FOSSÆ

AND THE

TOPOGRAPHICAL ANATOMY

OF THE VERMIFORM APPENDIX

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BY

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PREFACE

As the vermiform appendix has, within recent years, assumed a clinical importance entirely incommensurate with its insignificant proportions, it has seemed advisable to investigate any anatomical problems which may throw light upon such a treacherous disease as appendicitis. The present work is an attempt to solve, and to simplify the description of the cæcal folds and fossæ, and therefore indirectly the relations of the vermiform appendix.

The pericæcal folds and fossæ may be of interest only to the anatomist, but there can be no question as to the practical significance to the surgeon of the retro-colic fossæ. An appendix lying in one or other of these fossæ, may not only predispose to appendicitis, but may preclude the removal of such an appendix.

The photographs illustrating the various

pericæcal folds and fossæ are from original specimens examined by the author. It is to be regretted that the anatomical relations of the more important group—the retro-colic fossæ — prevent the possibility of illustration by photographs.

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School of Medicine of the Royal Colleges,
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Figure 16. *The cæcum of a pigeon showing its lymphoid tissue.*

„ 17. *The cæcum and intestine of a pigeon.*

SECTION I

The Pericæcal Folds and Fossæ

Not the least interesting feature in the anatomy of the cæcum and vermiform appendix is the question of those fossæ which are known as the pericæcal and retro-cæcal fossæ with their component folds.

The pericæcal, or primary fossæ are those produced about the cæcum by means of peritoneal folds raised from the enteric mesentery by the vessels to and from the cæcum and appendix. They maintain their form and situation both before and after the removal of the parts from the body.

The retro-cæcal, or secondary fossæ are situated behind the cæcum and ascending colon, and depend for their existence upon the secondary coalescence, sometimes wanting, of the colon, cæcum and mesentery to

the posterior abdominal wall. They are only visible with the parts in situ and are destroyed by removal of the organs concerned in their formation.

PART I

The Anatomy of the Pericæcal Folds and Fossæ.

On account of the existing diversity in the nomenclature of these folds and fossæ it will be as well to state that the terms hereafter used in this work are those employed by the author and one or two other writers. The nomenclature of other authors will be pointed out in each instance, and so confusion will be avoided.

The pericæcal folds are three in number:—

1. The ileo-colic fold.
2. The ileo-cæcal fold.
3. The meso-appendix.

The resulting pericæcal fossæ are two in number :—

1. The ileo-colic fossa.
2. The ileo-cæcal fossa.

1. *The Ileo-Colic Fold.*

This fold was first described by Luschka (1) as recently as 1861 in the following terms :—"The lateral periphery of the extremity of the small intestine is ordinarily surrounded by a fold with a free concave border, a fold which at the same time also bounds a narrow crevice, above it loses itself upon the upper layer of the mesentery, below it passes downwards on to the coats of the cæcum. It encloses a large branch of the ileo-colic artery." (See fig. 1.)

Seven years later the fold was first named by Waldeyer (2) the "Superior Ileo-Cæcal," a term employed by Tuffier (3) and also by Treves (4), who, in 1885, stated that the fold was not always present and often formed but a slight fossa.

In 1890 Jonnesco (5) suggested the term "Mesenterico-Cæcal" for this fold and it may be at once stated that this author's work is the most complete, as it certainly is the most accurate, which has yet appeared upon the subject of the peritoneal folds. He says, when speaking of this fold :—"If we examine the ileo-cæcal angle on its anterior aspect we always find, without exception, whether in the aged, the adult, the child, or even in the embryo, a peritoneal fold which springs from the upper or right layer of the enteric mesentery, passes above or in front of the terminal portion of the ileum and loses itself upon the cæcum. The fold diminishes with age but is never wanting."

The fold itself he describes thus :—"The base is inserted into the anterior layer of the mesentery of the small intestine for a variable extent but always longer in children than in adults. Its apex is inserted into the anterior aspect of the cæcum near the root of the appendix. Its adherent or cæcal border

loses itself upon the anterior aspect of this organ, more or less near the spot where the ileum abuts on to the cæcum. Lastly, its free border, dull, semilunar, with its concavity turned to the left, is traversed by the anterior ileo-cæcal artery."

Lockwood and Rolleston (6), whose nomenclature of "Ileo-Colic" the present writer has adopted, prefer that name in opposition to Jonnesco for apparently two reasons: firstly, because the fold seldom reaches the cæcum as Jonnesco states, and secondly, to avoid confusion with another ileo-cæcal fold to be presently described.

Having made a detailed and careful examination of this, and the following folds and fossæ in 100 cases, the writer was induced to adopt the term "ileo-colic" as applied to this particular fold because his own investigations convinced him of the accuracy of the first of the reasons given by Lockwood and Rolleston, and also on account of the needless confusion arising from terming the fold

"Mesenterico-cæcal" and the resulting fossa "Ileo-cæcal" as Jonnesco does. "Ileo-colic" not only describes the fold accurately enough, but also admirably expresses the situation of the fossa as well. Whilst admitting the accuracy of Jonnesco's description of the ileo-colic fold, I cannot agree with him that it is never absent (see fig. 2); it is certainly best marked in the young, but the most careful examination failed to detect any trace of it in 12% of my cases,—5% being females, and 7% males, all over forty years of age.

That the fold is vascular in origin and in function all authors are agreed. It is raised up from the mesentery by the passage of a branch of the ileo-colic artery and serves to prevent any interference with the vascular supply during the various alterations of distension and collapse of the cæcum, colon, and ileum.

The following table will illustrate the nomenclature :—

Superior Ileo-Cæcal.	Mesenterico-Cæcal.	Ileo-Colic.
1. Waldeyer.	1. Jonnesco.	1. Lockwood and Rolleston.
2. Tuffier.		2. Kelynack.
3. Treves.		3. Berry.

2. *The Ileo-Colic Fossa.*

It will be more convenient to discuss the fossæ with their respective folds ; hence the ileo-colic fossa next demands attention, and as the actual presence of this fossa as well as its size, depth, extent and dimensions are all so absolutely dependant upon the fold a description of its essential constituent was absolutely requisite in the first instance. Luschka first mentioned the fossa, but Waldeyer was the first to name it, terming it the "Superior ileo-cæcal fossa." He states that he has found this fossa in fifteen embryos of both sexes but that it occasionally disappears in adults.

Treves employs the same term and says the fossa is not always present and is often of only small size. The largest pouch he

met with admitted the point of the thumb to a depth sufficient to cover the nail.

Tuffier believes the fossa too small to play any pathogenic role and thinks that it is rather intended to lodge the vessels in the alternations of distension and of depression of the ileo-cæcal angle.

Jonnesco merely employs the term "ileo-cæcal" as applied to this fossa and states that it is of variable dimensions, well marked in the embryo, deep in the infant, and diminishes with age to such an extent as to be merely represented by a simple depression bounded by a pad. This progressive diminution of size he attributes to a two-fold cause, an increase of the different diameters of the cæcum with age, and secondly, to the invasion of the ileo-cæcal angle by fat. Jonnesco discards the classical name of "Superior ileo-cæcal" for this fossa "because it does not correspond to the reality. The fossa is not seated at the level of the ileo-cæcal angle but well in

front of the ileum, or to be more accurate, at the level of the anterior ileo-cæcal angle."

In a previous paper on "The Anatomy of the Cæcum" (7) the author attempted a definition of that viscus upon data, furnished by a series of casts of the interior of the cæcum. If that definition be accepted as correct, it follows that Jonnesco's nomenclature cannot be adopted. This particular fossa lies entirely above the cæcum as defined by the author, a belief shared by Lockwood and Rolleston; consequently whatever may be said as to the name of the fold which produces the fossa, there can be no question that the term "ileo-colic" is the correct one for the fossa.

This fossa should be termed "ileo-colic," and it may be defined as a small recess, elongated from above downwards, and situated between the ileo-colic fold in front, and the enteric mesentery and upper portion of the ileum behind. The insertion of the fold

into the large intestine, bounds the fossa externally, whilst internally it is free and open to the abdominal cavity. (See fig. 3.)

The fossa is of variable dimensions, decreasing in size with advancing age. Its existence being entirely dependant upon the presence of the ileo-colic fold, the fossa can never be present without the fold, though the fold may be present without the fossa. I found the fold present in 88% of my cases, whilst the fossa was only present in 66%.

TABLE OF NOMENCLATURE.

Superior Ileo-Cæcal.	Ileo-Cæcal.	Ileo-Colic.
1. Waldeyer.	1. Jonnesco.	1. Lockwood and Rolleston.
2. Treves.		
3. Tuffier.		2. Kelynack.
4. Hartmann.		3. Berry.

3. *The Meso-Appendix.*

The mesentery of the vermiform appendix or the meso-appendix, the most important of the pericæcal folds, is deserving of the closest attention by both the anatomist and the surgeon.

The earlier descriptions of this serous fold are somewhat involved, and it is occasionally difficult to understand precisely what the classical authors meant by their descriptions.

Huschke (8), Luschka and Bochdalek, Jr. (9), all described the meso-appendix, the last writer terming it the "mesenteriolum" and stating that it may arise either from the right or the left layer of the enteric mesentery, and so may pass in front or behind the small intestine. This statement is not altogether accurate, and the term is perhaps a little clumsy.

Little (10), in 1871, states that an internal hernia may take place by the slipping of a loop of intestine through a hole—either congenital or acquired—in the meso-appendix. He not only describes such a case but also refers to a somewhat similar one published by Partridge in the "Transactions of the Pathological Society of London." (11.)

Treves (12), in 1890, gave the following detailed description of this fold :—

"The mesentery of the appendix is formed by a fold of peritoneum, which comes off from the left or under layer of the mesentery of the end of the ileum. Its origin from this layer is along a straight line, which is situated at a short distance from the intestine, and which is not quite parallel with the margin of the bowel. At one extremity this little fold runs right up to the ileo-cæcal junction, while at the other end it forms a free and concave margin. In its general outline it is triangular. In the fœtus it may extend to the tip of the appendix, but in the adult it often only reaches to the centre of the tube or to the junction of its middle with its distal third."

In a previous work, the Hunterian Lectures of 1885, Treves had described six positions for the meso-appendix, of which the above may be regarded as the first or normal position.

Ferguson (13) in 200 cases, and Maurin (14) in 112, found the meso-appendix constantly present. In 77 of Ferguson's cases

the appendix was so placed and covered by peritoneum that its perforation would open into the sub-peritoneal cellular tissue and establish a diffuse form of cellulitis. "Pus, in such cases," says Ferguson, "would most likely be present in the situation of a psoas abscess."

Clado (15), in 1892, suggested the term "Posterior Meso-Appendix," described the fold as triangular, and condemned those authors who assert that the mesentery does not envelop the terminal portion of the diverticulum.

Lockwood and Rolleston give several variations which they state may be found in the meso-appendix, amongst others, occasional absence, so that the appendix is quite free within the abdomen, and obliteration of the fold, by its peritoneum being spread out in the iliac fossa by the traction of the gubernaculum. I have met with no examples of either variation.

Kelynack (16) is of opinion that the meso-

appendix is almost invariably present, though subject to considerable variations in length, thickness and extent of attachment. He criticises the statements of Treves, Lockwood and Rolleston, and others, that the meso-appendix does not extend throughout the entire length of its viscus. "Such," says he, "is not the impression he has formed from an examination of eighty cases made specially with this object in view, in sixty-four of which the mesentery extended to the tip and in fourteen almost to the tip of the appendix, the mesentery in the remaining two extending to less than half of the appendix."

Fowler (17), on the other hand, states that in 25% of cases the appendix is but partially covered by a peritoneal investment.

Jonnesco differs from every previous author in describing the meso-appendix as of quadrilateral outline. Its four borders are superior or mesenteric, right or cæcal, left or free, and inferior or appendicular. "This last is inserted along the superior aspect of the

appendix, not throughout its whole extent but only in the first half or thereabouts." Upon this point only is the present writer at variance with Jonnesco in his description of this mesentery.

This brief summary of the literature of the meso-appendix sufficiently indicates the points upon which the various authors differ. These are, first, the shape of the meso-appendix, whether triangular or quadrilateral; and secondly, its relation to the vermiform appendix, whether a complete or an incomplete investment for that organ.

A careful analysis of the meso-appendix in one hundred cases has led the author to the following conclusions :—

The meso-appendix is a double fold of peritoneum which entirely surrounds the vermiform appendix, constituting its mesentery. Though generally of a triangular aspect it is always quadrilateral in outline, that is to say, four borders can always be described, though one border may be so short

as to give the impression that the structure is triangular. (See figs. 4 and 5.) As to the nomenclature and description of these borders I am entirely in accordance with Jonnesco except as regards the inferior or appendicular border. This mesentery, in my opinion, never stops midway along the course of the appendix, as Jonnesco and others state. In most cases the mesentery can be demonstrated to the naked eye extending along the whole length of the appendix, and in those cases where the meso-appendix appears only to extend midway along the appendix, microscopic examination will conclusively prove that a peritoneal covering is investing the whole length of the appendix.

The meso-appendix is a constant structure never absent, except perhaps, as a result of disease, or some error of development; and in about 75% it is, what may be termed normal, that is, it presents the four borders of Jonnesco, and has the attachments already given.

In at least 25% of cases, the meso-appendix is abnormally situated, occupying either one of the five remaining positions given by Treves (See figs. 6, 7, 8 and 9), or some other much rarer position, not mentioned by that author.

Without entering into details, it may be sufficient to say, that in these five positions, as given by Treves, the meso-appendix is gradually displaced on to the posterior surface of the cæcum, until finally, in the sixth position, "the appendix has no mesentery at all, but is adherent in a vertical line, to the posterior wall of the cæcum, its extremity being, as a rule, however, free." (See fig. 10.) Even here the appendix will be found to have a peritoneal fold corresponding to its mesentery, so that it is still possible to accept Treves' sixth position, and maintain that the meso-appendix is a constant structure. In my series of cases, the meso-appendix was normal, that is, occupied Treves' first position in about 75%.

It occupied the second position in 6%, the fourth in 4%, the fifth in 3%, and the sixth in 3%. In three other cases the meso-appendix was so extraordinary as to deserve special notice.

In two cases, one a male, aged forty, the other a female, aged forty-seven, the meso-appendix was represented by an ileo-cæcal fold, though it is quite possible that the two folds were fused into one. (See fig. 11.)

The third case was even more remarkable; in this case, a male aged two, the meso-appendix was anterior in position and origin, arising as it did from the right or anterior layer of the enteric mesentery, and passing down to the appendix in front of the ileum. It would thus appear to have been developed from an ileo-colic fold. (See fig. 12.) There were no other pericæcal folds present. Two of these last three abnormalities were from lunatics.

In those cases where the meso-appendix may be described as normal, the average

length of the superior or enteric border—the base, as the writer prefers to call it—was about 4·0 cm.

From what has been said in reference to the abnormalities of the meso-appendix, it will be evident that each succeeding position of this mesentery tends to displace the vermiform appendix more and more behind the cæcum, until in the fifth and sixth positions, the appendix lies entirely behind the viscus. If the writer's views as to the etiology of appendicitis (18) be accepted, it follows that about 6% of the populace have appendices so situated as to predispose them to appendicitis.

4. *The Ileo-Cæcal Fold.*

Santorini (19) was the first to describe this fold. It then lapsed into obscurity and Huschke gave what is probably the classical description of it. This author apparently regarded the fold as a part of the meso-appendix.

Luschka in 1861 bestowed upon the fold the name which is here adopted of "Ileo-Cæcal." He says that it contains a few muscular fibres continuous with the muscular coat of the cæcum and that its function is to assure the position of parts about the ileo-cæcal junction and to bring about any changes of position which may become necessary. He also adds that the communication between the small intestine and the large may be obstructed by various circumstances, particularly by the ileum assuming a nearly vertical direction, and it is precisely to prevent this accident that the fold is so regularly disposed between the cæcum and small intestine.

Treves in 1885 stated that the fold is non-vascular, and hence proposed the name "Bloodless Fold."

Tuffier, on the other hand, questions the non-vascularity of the fold and adopts Waldeyer's nomenclature of "Superior Ileo-Cæcal."

Lockwood and Rolleston, so far from describing the fold as non-vascular, state that in addition to the fat and muscular fibres which are contained within its two layers there are arteries and veins derived from three sources, the anterior and posterior ileo-cæcal vessels, and the appendicular vessels, which last are also recurrent. Further on, these authors add that more often the ileo-cæcal fold is small and comparatively non-vascular and merely lies in the ileo-cæcal angle, whilst not unfrequently it is absent.

Clado proposes the name of "Anterior Meso-Appendix" for this fold and does not think it is of any importance. He doubts Luschka's muscular theory of function.

Lastly, there is Jonnesco, who terms the fold "Ileo-appendicular" or the "anterior fold," describes it as quadrilateral, and regards its non-vascularity "as a mistake."

The ileo-cæcal fold, not nearly so important as the meso-appendix, is, like it, best

described as quadrilateral, the borders being as Jonnesco suggests :—

1. Superior or enteric. Variable in extent.
2. Inferior, becoming lost on the anterior surface of the meso-appendix.
3. External or cæcal.
4. Internal, free or concave.

From this it is obvious that the fold occupies the ileo-cæcal angle, that three of its borders are attached, and that it lies in front of the meso-appendix. (See fig. 13.) The superior border is attached to the lower edge of the ileum for a variable distance ; in my series of cases, this attachment varied from 2·5 cm. to about 10·0 cm., the average being about 5·5 cm. The fold was absent in about 10% of the cases. (See fig. 14.)

Regarding the vexed question of its vascularity, whilst it may be admitted that it is the least vascular of the three pericæcal folds, it cannot be admitted that it is non-vascular. Microscopic examination will always prove this to be the case, and it

appears more than probable that like the two other pericæcal folds it is vascular in function.

The nomenclature is more confusing than usual, thus :—

1. Superior Ileo-Cæcal. Waldeyer and Tuffier.
2. Bloodless Fold. Treves.
3. Anterior Meso-appendix. Clado.
4. Ileo-Appendicular or Anterior Fold. Jonnesco.
5. Ileo-Cæcal Omentum. Little.
6. Ileo - Cæcal Fold. Lockwood and Rolleston ; Kelynack ; Berry.

The last name appears to the writer the best, as easily and accurately indicating the position of the fold, the name also serving to designate the fossa next to be described, a fact which reduces confusion to a minimum. For the rest, those terms which are not absolutely erroneous, as one or two undoubtedly are, are not so good as the classical designation here adopted.

5. *The Ileo-Cæcal Fossa.*

Having studied the meso-appendix and the ileo-cæcal fold, the formation of this, the more interesting, the more important, and the more constant of the two pericæcal fossæ, may now be easily understood.

Apart from any anatomical considerations this fossa has a practical bearing upon the production of appendicitis. Talamon (20) aptly illustrates this when he says: "It is only right to enquire if in certain cases the appendix could not become involved and confined in this fossa, and thus if such an anatomical arrangement might not become a cause of appendicitis or rather of appendicular colic." Talamon apparently thought not, but this is probably a misconception, for that such cases do occur was shown in a foot-note appended to the English translation of his work.

The classical authors are extremely confusing on this fossa, and therefore their work

may be omitted; suffice it to say that Huschke was the first to describe it.

Treves designated it the "Inferior ileo-cæcal fossa" and says that "between the bloodless fold (the ileo-cæcal of the writer) and the appendix mesentery there is a fossa that is almost constant and is often very capacious. It will commonly lodge two fingers as far as the first joints. It opens outwards, its apex is at the ileo-cæcal junction, and it is bounded on one side by the small intestine and on the other by the caput coli." (See fig. 15.)

Clado proposes the accurate but unwieldy name of "Vermi-ileo-cæcal" for this fossa, whilst Lockwood and Rolleston describe one of the retro-colic fossæ by the term "ileo-cæcal."

Jonnesco gives, as usual, an accurate description of the fossa under the name of "Ileo-appendicular." "The fossa is," he says, "bounded above by the ileum, in front by the ileo-cæcal fold, and behind by the meso-

appendix. The anterior superior angle results from the insertion of the ileo-cæcal fold into the ileum. The posterior superior angle from the junction of the meso-appendix with enteric mesentery and the inferior angle from the junction of the two appendicular folds, ileo-cæcal and meso-appendix." This description, in which the present writer's nomenclature is substituted instead of the original, is exceedingly accurate, much more so than that of Tuffier, who also describes the angles of the fossa.

The site and formation of the ileo-cæcal fossa having been sufficiently demonstrated by the above, it only remains to add that the fossa is the more constant of the two peri-cæcal fossæ. I found it present in about 74%, which I think is more accurate than Tuffier, who states that he found it in over 90%, and for this reason. The fossa is almost entirely dependant for its formation upon a normally situated meso-appendix. In the fourth, fifth, and sixth positions of the

appendicular mesentery, as given by Treves, there cannot possibly be an ileo-cæcal fossa. I found the meso-appendix so situated in 13%, whilst from other causes the ileo-cæcal fossa may be absent in say, a like number of cases, consequently it appears more than probable that the figures given above will be found, on the whole, more accurate than those of the French author.

TABLE OF NOMENCLATURE.

1. Inferior Ileo-Cæcal Fossa.
    1. Waldeyer.
    2. Treves.
    3. Tuffier.
2. Ileo-Appendicular Fossa.
    1. Jonnesco.
3. Vermi-Ileo-Cæcal Fossa.
    1. Clado.
4. Ileo-Cæcal Fossa.
    1. Luschka.
    2. Lockwood and Rolleston.
    3. Kelynack.
    4. Berry.

PART II

The Evolution of the Pericæcal Fossæ

The pericæcal folds are undoubtedly vascular in origin, that is to say, they are evolved by the passage of blood vessels from the enteric mesentery to the cæcum and appendix. As these folds determine the resulting fossa an explanation of the evolution of the former will serve for the latter.

Treves explains the origin of the pericæcal folds from a study of comparative anatomy. He primarily insists on the fact that the appendix of man represents nothing more than the long cæcum of many of the lower animals—which, by the way, is open to question—and that it must therefore be regarded as part of the cæcum proper and not as a rudimentary appendix.

Proceeding on this theory Treves states

that such animals as have a long cæcum have always a fold of peritoneum, the true mesentery of the cæcum, occupying the position of the ileo-cæcal fold in man. The ileo-cæcal or bloodless fold is, then, according to Treves, the representative of the true mesentery of the cæcum in the lower animals, but in man it has nothing to do with conveying blood to the cæcum, that viscus being supplied in man by the ileo-colic artery, which on approaching the cæcum divides into an anterior and a posterior branch, the anterior branch crosses the ileo-cæcal junction in front and raises up a fold of peritoneum which in man is known as the ileo-colic fold. The posterior branch occupies a similar position behind the gut, entering, and practically producing the meso-appendix. This, for Treves, is a substituted mesentery, the true mesentery of the appendix being represented by the non-vascular plica that runs from the surface of the ileum to the substituted mesentery of the appendix.

Jonnesco holds that the meso-appendix is the true appendicular mesentery and that the ileo-colic and ileo-cæcal folds are the mesenteries of the cæcum. That the meso-appendix is not, as Treves would have us believe, a substituted mesentery, says Jonnesco, is proved by the fact that the ileo-cæcal fold which the English author regards as the true and original meso-appendix is the only one which is ever found wanting.

Whilst the writer's statistics do not confirm Jonnesco, they do prove that the meso-appendix is the only constant fold, and the constancy of this mesentery is a fact accepted by almost every author. Arguing from this fact it would appear that the appendix is gradually replacing the cæcum in functional activity. Such a theory is supported by the facts concerning the pericæcal folds; the meso-appendix is the largest, the most constant and the most vascular of the three, hence it is presumably concerned in the more functionally active of the two viscera. The

ileo-colic and the ileo-cæcal folds are smaller, less vascular, and inconstant, therefore they are probably concerned in the less functionally active viscus, together constituting the mesentery of the cæcum. This is further supported by the fact that the meso-cæcum of the text-books is non-existent. Then, again, there is Lockwood and Rolleston's statement that the ileo-cæcal fold, part of the cæcal mesentery, is supplied by the recurrent appendicular vessels.

The relatively larger amount of lymphoid tissue in the human appendix as opposed to the cæcum, and the presence of large amounts of lymphoid tissue in the apex of the cæcum—the histological homologue of the human appendix—in the lower animals, also point to the vermiform appendix being probably more functionally active than the cæcum. (See figs. 16 and 17.)

In any case, the facts emphasize the probability of the ileo-colic and the ileo-cæcal folds being true cæcal mesenteries, primary

and subsidiary respectively, and the meso-appendix the true appendicular mesentery.

PART III

The Pathology of the Pericæcal Folds and Fossæ

The pericæcal fossæ are not so important pathologically as are the retro-colic fossæ.

The ileo-colic fossa is too small and inconstant to give rise to any pathological conditions.

The ileo-cæcal fossa, being larger and more constant, may become the seat of an internal hernia of the vermiform appendix. Elliot (21) has published one such case, and the writer has also observed instances, hence it may be concluded that such herniation may occur, but is rare. Such a hernia of the appendix might of course produce appendicitis.

The meso-appendix may either produce

intestinal obstruction or be the seat of an internal hernia as recorded by Little.

Circulatory lesions of this mesentery may possibly produce appendicitis and even gangrene of the appendix, whilst lastly, the surgeon should remember when performing an appendicectomy in those cases where the meso-appendix is normal in attachment, that its vessels should always be carefully ligatured.

SECTION II

The Retro-Cæcal or Retro-Colic Fossæ

The retro-cæcal or retro-colic fossæ, as they are more accurately termed, are situated behind the ascending colon and cæcum. They are dependent for their existence upon the secondary coalescence, sometimes wanting, of the colon, cæcum and mesentery to the posterior abdominal wall, visible only with the parts in situ, they are destroyed by the removal of the organs concerned in their formation.

These fossæ, when present, which is by no means always the case, are usually two in number. Exceptionally there are more than two, and not unfrequently only one.

As they are more frequently situated

behind the ascending colon than the cæcum, the writer would suggest the term Retro-Colic. Accepting Jonnesco's nomenclature of external and internal, the fossæ would thus be termed :—

1. Internal retro-colic.
2. External retro-colic.

PART I

The Anatomy of the Retro-Colic Fossæ

As in the case of the pericæcal fossæ, the literature presents the greatest diversity of description and nomenclature. By adopting the above simple classification, confusion, it is hoped, will be reduced to a minimum.

The internal retro-colic fossa was the first to be described, and that by Huschke in the following terms :—" I have occasionally found a falciform fold formed by the peritoneum and the iliac fascia, very prominent within and

above, and forming a species of bed for the cæcum. This fold arises in the form of a sickle from the right internal iliac muscle and forms a fossa having the shape of a sac opening upwards in order to receive the cæcum; consequently it is somewhat convex below, concave above and passes on to the abdominal wall." This fold which Huschke terms the "Ligamentum Intestini Cæci" is, as will afterwards be seen, the inner boundary of the fossa and is now known as the internal parieto-colic fold.

The external retro-colic fossa was first described by Treitz (22) in 1857. He says, "It is found behind or below the cæcum and may therefore be termed the subcæcal fossa. Sometimes it is represented by a small excavation, but occasionally by a sac as long as the finger, extending upwards between the layers of the ascending meso-colon. Its mouth looks forwards and downwards towards the free extremity, and it is frequently necessary to raise this up in order to see the fossa."

Gruber (23), two years later, also described the subcæcal fossa of Treitz and proposed for it the gigantic name of "Retro-eversio hypogastrica dextra seu inferior dextra."

Waldeyer describes the internal retro-colic fossa as being comparatively frequent, and adds that he has often seen it. The external is less frequent and when present can only be confounded with the internal retro-colic fossa.

In 1885 Treves strongly expresses his belief that the retro-colic fossæ are more or less mythical. The two pericæcal fossæ are the only constant ones. Of the retro-colic fossæ, he adds, "Certain fossæ are described as constant that would appear to be exceedingly rare. The subject has suffered also from a reckless and exuberant nomenclature and one little fossa termed indiscriminately the fossa ileo-cæcalis infima, the fossa subcæcalis, and the recessus retro-appendicularis I have entirely failed to discover."

Only those who have studied the subject

can sympathise with Treves in his remarks upon nomenclature. The fossa which this author failed to find is the external retro-colic, the less constant, it will be remembered, of the two. He admits that certain folds are occasionally found along the line at which the peritoneum is reflected from the back of the cæcum (which of course should read colon) on to the posterior abdominal parietes. When two exist they may enclose a fossa. These fossa are not deserving of a special name, are rare, variable, and evidently more or less accidental.

Tuffier's work is principally concerned with the folds which bound the fossæ rather than with the fossæ themselves. The folds he regards from a physiological standpoint and terms them the ligaments of the cæcum, by means of which the cæcum is maintained in position. The innermost wall of the internal retro-colic fossa is Tuffier's inferior ligament of the cæcum and its outermost wall his superior ligament. The former is the same

as Huschke's ligamenti intestini cæci or the internal parieto-colic fold as it is now termed. Upon twenty-seven occasions Tuffier found the vermiform appendix lying in fossæ bounded by his cæcal ligaments yet he does not regard these fossæ as sufficiently constant or large enough to have any pathological significance, a conclusion from which the writer strongly dissents, as does also Jonnesco.

Lockwood and Rolleston, in an otherwise admirable piece of work, have confused matters by applying the term ileo-cæcal to one of the retro-colic group, that term belonging exclusively to one of the pericæcal fossæ and not to the retro-colic group at all.

This ileo-cæcal fossa of Lockwood and Rolleston is, properly speaking, the internal retro-colic fossa and is described by them as follows :—"In its typical state this fossa is comparatively simple and quite independent of the vermiform appendix, or its mesentery, or of any other peritoneal folds,

except the mesentery of the ascending colon and the enteric mesentery. It is bounded on the right by the mesentery of the ascending colon and on the left by the mesentery. It is situated behind the angle of junction of the ileum and cæcum, which have both to be lifted up to see its mantle. The fossa itself runs a varying distance upwards behind the ileo-colic junction and parallel to the ascending colon."

The external retro-colic fossa, termed by Lockwood and Rolleston the "subcæcal," they describe thus :—"This fossa is situated directly beneath the cæcum, which has to be lifted up to bring it into view. Its mouth is usually at the junction of the cæcum and colon or beneath either, and it separates the layers of the meso-cæcum or the meso-colon ; its fundus runs upwards behind the ascending colon between the layers of the ascending meso-colon."

In view of our present knowledge it is obvious that the terms "cæcum" and

"meso-cæcum" are here very loosely used and that the fossa is much better described as retro-colic." A fossa can hardly be accurately called "subcæcal" which lies entirely behind the ascending colon.

The following description of these important fossæ is based upon a careful analysis of the writer's cases combined with a study of Jonnesco's excellent work on the subject published in 1890.

When both fossæ are present three peritoneal folds are required for their formation, these are from without inwards :—

1. External parieto-colic fold or the outer layer of the ascending meso-colon.
2. Internal parieto-colic fold or the inner layer of the ascending meso-colon.
3. Mesenterico-parietal fold, an abdominal attachment of the enteric mesentery internal to the meso-colon.

Why Jonnesco should term the first two

folds "Parieto-cæcal" it is difficult to imagine. They both lie behind the ascending colon, they are constituents of the ascending meso-colon and in any case are situated entirely above the cæcum. Hence the writer is convinced that the terms adopted by him of parieto-colic folds and retro-colic fossæ are at once more accurate and scientific than the word "cæcal," employed by so many writers in such a manner.

Combining the retro-colic fossæ with their component folds and again passing from right to left the following order would be observed :—

1. The outer layer of the ascending meso-colon or the external parieto-colic fold.

   External retro-colic fossa.

2. The inner layer of the ascending meso-colon or the internal parieto-colic fold.

   Internal retro-colic fossa.

3. Posterior attachment of the enteric mesentery or the mesenterico-parietal fold.

This indicates in a clear and intelligible manner the position and boundaries of the retro-colic fossæ.

When the ascending colon shows no division between its two layers then the external retro-colic fossa disappears, hence the internal retro-colic fossa is the more constant of the two. If the enteric mesentery does not become secondarily attached to the posterior abdominal wall then the internal retro-colic fossa also disappears.

The external and internal parieto-colic folds, being merely the two layers of the ascending meso-colon, require no description.

The mesenterico-parietal fold is so well described by Jonnesco that his words may with advantage be reproduced. "Pointed out for ages, this fold is well described by Tuffier under the name of the inferior liga-

ment of the cæcum (a name Jonnesco cannot admit, as the fold springs primarily from the mesentery). Triangular, its superior or mesenteric border is inserted into the posterior layer of the mesentery, the ileo-cæcal angle and the border of the cæcum for a short distance varying in different cases. Its parietal border is adherent to the iliac fossa, at the level of the sacro-iliac articulation, and sometimes passes on to the spermatic vessels where they cross the external iliac vessels; sometimes this border is very elongated and follows these vessels nearly as far as the crural ring. Lastly, the free border is directed forwards, is concave, and sometimes looks slightly to the left. The summit of this fold is lost above and behind upon the mesentery."

The more constant internal retro-colic fossa has the following boundaries :—

1. In front. The posterior wall of the ascending colon and sometimes the cæcum.

2. Behind. The posterior abdominal wall.
3. Internally. The mesenterico-parietal fold.
4. Externally. The internal parieto-colic fold.

The less constant external retro-colic fossa is bounded as follows :—

1. In front. The posterior wall of the ascending colon and sometimes the cæcum. The posterior longitudinal muscular band is situated between the intestinal attachment of the two peritoneal folds which bound the fossa laterally.
2. Behind. The posterior abdominal wall.
3. Internally. The internal parieto-colic fold.
4. Externally. The external parieto-colic fold.

I have specially studied these fossæ in twenty cases. Their examination must necessarily be made either at a *post-mortem*

or in the dissecting-room, and their examination is still occupying my attention as opportunity arises.

In these twenty cases one or another of the fossæ was present upon six occasions, both fossæ were present twice, the internal alone three times and the external alone once. This would give the following percentages :—

1. Internal fossa alone, . 15%.
2. Both fossæ, . . . 10%.
3. External fossa alone, . 5%.

In five out of the six occasions the vermiform process was lodged in one or other of the fossæ. When both the fossæ were present the appendix lay in the external fossa, it was also found lying in the internal retro-colic fossa upon the three occasions upon which that fossa alone was present. Upon the single occasion upon which the external retro-colic fossa was present it did not lodge the vermiform appendix.

Retro-cæcal or retro-colic positions of the vermiform appendix are more frequent than is supposed, and further, the appendix may assume that position without the retro-colic fossæ being necessarily present. The writer places the retro-colic positions of the vermiform appendix second in order of frequency, the pelvic positions occupying the first place. (24.)

TABLE OF NOMENCLATURE.

Author.	Internal Retro-Colic.	External Retro-Colic.
1. Huschke.	Cæcal.	
2. Treitz.	Cæcal.	
3. Gruber.		Retro-eversio hypogastrica dextra seu inferior dextra.
4. Waldeyer.	Cæcal.	Subcæcal.
5. Treves.	Nil.	Nil.
6. Lockwood and Rolleston.	Ileo-Cæcal.	Subcæcal.
7. Jonnesco.	Internal retro-cæcal.	External retro-cæcal.

PART II

The Evolution of the Retro-Colic Fossæ

That the retro-colic fossæ, unlike the peri-cæcal fossæ, are secondary in origin there can be little doubt. There are strong grounds for assuming the truth of this statement notwithstanding the adverse opinion of several authors.

Lockwood and Rolleston, in describing the evolution of their so-called ileo-cæcal fossa, the internal retro-colic of this work, would make it primary in origin. They state that the fossa is developed during the descent of the cæcum from under the liver, descent being assisted by the gubernaculum, connected to the cæcum by the mesorchium or mesovarium. As this pulls the organ towards the iliac fossa, the peritoneum beneath the mesentery descends unequally and the part near the ileo-cæcal junction remains behind, hence by the time the cæcum and

the right colon have assumed their permanent position a recess has been created which is the internal retro-colic fossa, their ileo-cæcal. The reason for this incomplete descent they cannot explain.

Treitz adopted a somewhat similar view, as also did Gruber, both previous to the above-mentioned authors.

Waldeyer also advocated an embryonic origin. According to him the cæcum during development goes on descending after the extremity of the ascending colon has become fixed, consequently it will necessarily give rise to peritoneal folds at its sides and beneath it, between which will be found the retro-colic fossæ.

These theories would all make the retro-colic fossæ primary in origin instead of secondary as is probably the case. If they were primary in origin, they should also be as constant as the pericæcal fossæ which is not the case, consequently some more suitable theory must be found.

The simplest, and at the same time the most satisfactory theory, is that of Jonnesco. He states that the retro-colic fossæ are due to a secondary and delayed adhesion of the ascending colon, a portion of the cæcum, and the ileo-cæcal angle to the posterior abdominal wall.

This theory has the further merit of proof, as Todlt has actually observed the process of secondary adhesion going on whilst Jonnesco states that he has himself proved that the theories of Treitz and others are erroneous, as the cæcum never has the relations with the mesorchium which those writers suppose.

Additional proof in favour of Jonnesco's line of argument is furnished by the fact that all the cases of retro-colic fossæ which have come under my notice have been in persons whose ages ranged from forty to seventy years. If they were primary in origin those fossæ would be formed before that age and they would be almost as frequent as the

undoubtedly primary pericæcal folds, which is not the case.

PART III

The Pathology of the Retro-Colic Fossæ

The chief interest of these fossæ lies in the fact that one or other of them frequently lodges the vermiform appendix and hence, as the writer has shown elsewhere (18), may prove a distinct factor in the production of appendicitis.

Surgically the fossæ are of the greatest practical importance. Every surgeon should be perfectly familiar with their anatomy, because, should he persist in attempting to remove a chronically inflamed appendix, buried in adhesions and lying in one or another of the retro-colic fossæ, he may be sacrificing the life of his patient to a lack of knowledge.

SECTION III

The Topographical Anatomy of the Vermiform Appendix

Sectional anatomy, the most accurate of all anatomical methods, has unfortunately, so far as the appendix is concerned, proved the least remunerative field of research, the majority of the various topographical works omitting all mention of the vermiform appendix or, at most, giving little more than a passing reference to that organ.

Braune (25), in his "Atlas of Topographical Anatomy," merely says "the section of the vermiform appendix is seen on the upper border of the right psoas." A closer examination of this plate, number 18, shows it to be a coronal section of the

pelvis showing the relations of the hip-joint. The appendix is lying upon the upper border of the right psoas muscle to the inner side of the cæcum and about midway between the mesial plane and the crest of the ileum. The section cuts the appendix transversely so that it must obviously have been running forwards at right angles to the plane of the section.

Symington (26), in his "Topographical Anatomy of the Child," mentions two cases. The first plate which he figures and describes is from an emaciated girl of six years. Here "the apex of the cæcum is normal in position, being about opposite the middle of Poupart's ligament. The vermiform appendix was coiled up behind the cæcum."

His second instance is from a well-formed boy aged five years. "The cæcum here is in contact with the anterior abdominal wall just above Poupart's ligament. The vermiform appendix, instead of being coiled up, as in the girl, is directed upwards and

inwards upon the psoas muscle until near its tip, where it turns downwards and to the left."

The appendix in Symington's first case is retro-cæcal in position, and in the second case it is occupying Treves' so-called normal position. These positions the writer has, in a previous paper, placed second and third respectively in order of frequency.

Dwight (27), in his "Frozen Sections of a Child," has one plate illustrative of this subject. This section passes through the intervertebral disc between the third and fourth lumbar vertebræ. "The cæcum is seen lying on the right side of the abdomen. More than one half is below the surface of this section, so that we may with sufficient accuracy say that it is on a level with the umbilicus. The vermiform appendix, which arises from the rear of the cæcum, at a still lower point, appears behind it. It pursues a twisted course, upward and inward.

"To understand this position of the

cæcum," says Dwight, we must remember that in the early part of fœtal life, the cæcum, which is a little diverticulum of the intestine, lies below the liver near the median line. The future large intestine runs from this point to the left, and then downward. Gradually, however, the cæcum moves to the right above the mesentery, thus forming the transverse colon. It then descends along the right side of the abdomen, forming the ascending colon. According to Dr Allen Thomson, the parts are in the same position as in the adult in the fourth or fifth month of fœtal life. Kolliker states that they descend toward the iliac fossa in the latter half of fœtal life. It is evident that in this child the cæcum had made very little progress in its descent from the right hypochondrium. My observations lead me to believe that the wanderings of the cæcum are not completed as soon as these authorities state. I doubt very much if, as a rule, it has reached its permanent position at birth,

and think that not very rarely does it reach it for a year or two afterward."

In Dwight's case the appendix is occupying the inward position, the third in order of frequency according to the writer, but first or normal position, according to Treves. Dwight's remarks concerning the descent of the cæcum are of considerable interest, and have been given in full because my own anatomical researches tend rather to confirm his view, that complete descent of the cæcum is not accomplished so soon as has been hitherto supposed. Thus one of my cases, No. 78, was from a boy aged five years. The cæcum was exceedingly small, embryonic in character, and belonged to the first type. It had not descended to its usual position, but lay midway between the liver and the pelvic brim, rather nearer the liver than the pelvis. The appendix was lying coiled up just below the cæcum, and was visible immediately on opening the abdomen and exposing the cæcum.

Rüdinger (28) has one interesting plate in his "Topographische-chirurgische Anatomie des Menschens," published in 1873. Thus, in plate 2, the appendix is figured in the pelvic position, its apex just overhanging the external iliac artery ; beyond this, Rüdinger's work does not throw much light upon the anatomy and relations of the vermiform appendix.

The works of Pirogoff (29) and le Gendre (30) are also equally disappointing in regard to the topography of the appendix.

Mettenheimer, in a recent publication, figures the cæcum and appendix vermiformis in transverse section, and states that the latter usually lies behind the cæcum.

My own researches in this field consist of frozen sections made upon three full term fœtuses. In one case, a female, the body having been frozen, was divided longitudinally into equal halves. The right half was then sawn transversely in several planes, commencing in the mid-dorsal region, and

passing downwards below the pelvis. One of these transverse sections was found to have passed through the fourth lumbar vertebra, and on the upper surface of this section the cæcum and appendix were duly found.

The cæcum, entirely invested by peritoneum, was lying partly upon the iliacus muscle and partly upon the psoas, occupying a very posterior position.

The vermiform appendix ran almost transversely forwards at right angles to the cæcum and was only visible after carefully dissecting up some of the super-adjacent structures. Such a position is somewhat rare.

In the other two cases, both males, the appendix was found lying to the inner side of the cæcum occupying what would, had development proceeded, have corresponded to the pelvic position.

This brief summary of the best topographical works published during the present century proves how disappointing is this

field of research as applied to the vermiform appendix. The results of sectional anatomy upon the fœtus are not altogether satisfactory, but as it is impossible to obtain adult subjects for this class of work the fœtus offers the next best field, and more requires to be done in it.

Adopting the positions of the vermiform appendix given by the writers in a previous paper, the following is the result as gleaned from topography :—

Author.	Pelvic Position.	Retro-Cæcal.	Inward.	Variable.
1. Braune.	—	—	—	1
2. Symington.	—	1	1	—
3. Dwight.	—	—	1	—
4. Rüdinger.	1	—	—	—
5. Mettenheimer.	—	1	—	—
6. Berry.	2	—	—	1

So far as they go, these topographical results would tend to confirm the results as to the positions of the vermiform appendix obtained by the author by the more ordinary anatomical methods, and which have already been published.

SECTION IV

Summary of Conclusions based upon the Author's Original Investigations

The pericæcal folds are primary in origin and vascular in function. The ileo-colic and ileo-cæcal folds together represent the mesentery of the cæcum, the meso-appendix being the true appendicular mesentery. From the constancy of the last as opposed to the first two, together with other facts mentioned in the text, it would appear that the appendix is gradually replacing the cæcum in functional activity.

The meso-appendix is constantly present and is normally situated in about 75% of cases. When normal it is quadrilateral in outline, when abnormal it may assume almost any shape or situation. In 6% of its abnormalities the meso-appendix is so placed as to anatomically predispose the subject to appendicitis.

The meso-appendix envelops the appendix throughout, and may be the seat of an internal hernia or the cause of an intestinal obstruction.

The two pericæcal folds which together constitute the mesentery of the cæcum are inconstant, as are also the pericæcal fossæ. The fossæ are of little importance as compared with the next group.

The so-called retro-cæcal fossæ are better termed retro-colic. One or two such fossæ may be present and are best described as internal and external respectively. These fossæ are secondary in origin, present only in a small percentage of cases, but when present may play an important part in the production of appendicitis.

The topography of the vermiform appendix is as yet a comparatively unworked field. Results, so far as they go, tend to confirm the author's views as to the intra-abdominal positions of the appendix obtained by the ordinary methods.

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FIGURE 1.—THE ILEO-COLIC FOLD.

From a male aged 80. Anterior view of the ileum, cæcum and ascending colon. The ileo-colic fold, slightly fatty, is rather larger than usual, having a transverse diameter of 1.9 cm.

Figure 1

A.—The Ileo-Colic Fold

FIGURE 2.—ABSENCE OF THE ILEO-COLIC FOLD.

From a male aged 41. Anterior view of the ileum, cæcum and ascending colon. In this case there was no trace of the ileo-colic fold.

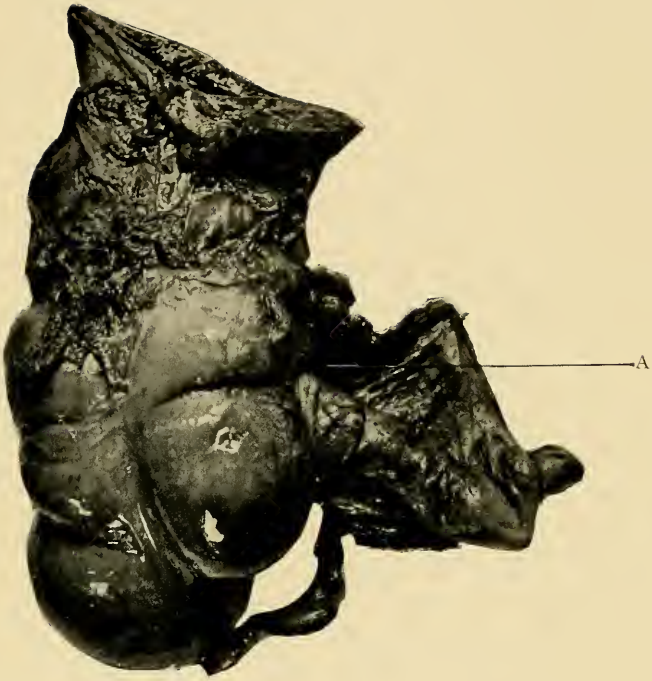
Figure 2

Absence of the Ileo-Colic Fold

FIGURE 3.—THE ILEO-COLIC FOSSA.

From a male aged 43. Anterior view of the ileum, cæcum, vermiform appendix and ascending colon. The ileo-colic fossa, produced by the ileo-colic fold, is well marked. The vermiform appendix is here unusually long, measuring 11.5 cm.

Figure 3

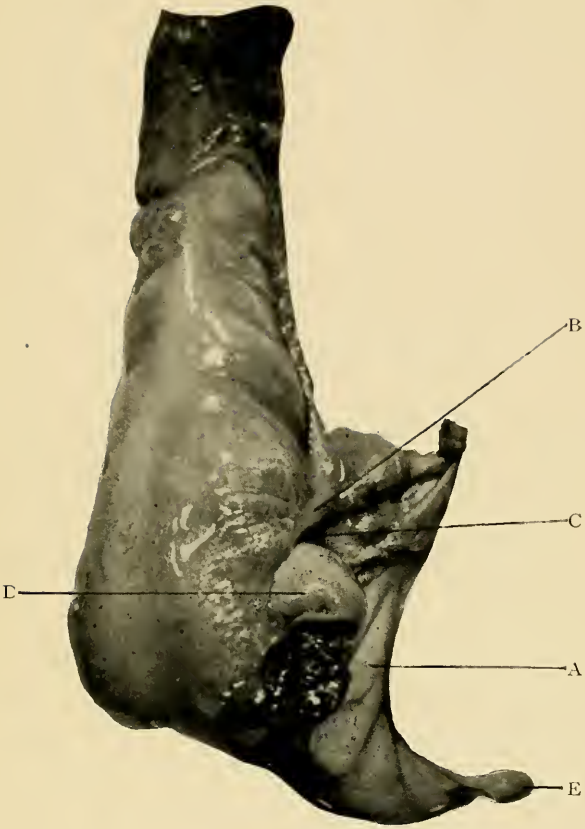


A.—The Ileo-Colic Fossa

FIGURE 4.—THE MESO-APPENDIX.

From a male aged 8 months. Anterior view of the cæcum, ascending colon, and the vermiform appendix. The ileum has been cut short in order to expose the meso-appendix from the front. This is a normally situated meso-appendix with a typical quadrilateral outline. The superior or enteric border and the outer or cæcal border each measured 2.5 cm.

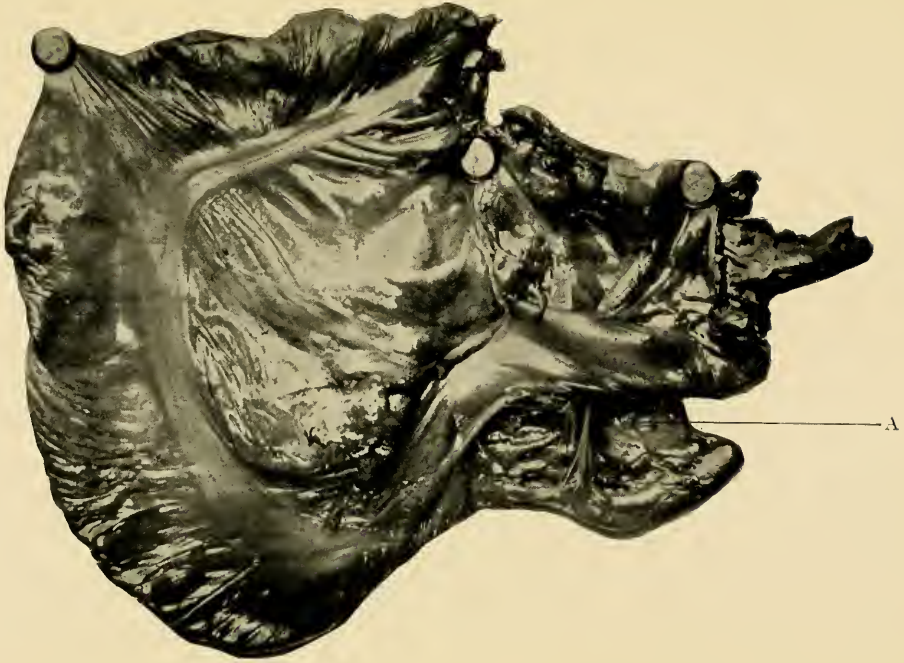
Figure 4



A.—The Meso-Appendix
B.—The Ileo-Colic Fold
C.—The Ileo-Colic Fossa
D.—The Ileum Cut Short
E.—The Vermiform Appendix

FIGURE 5.—THE MESO-APPENDIX.

From a male aged 55. Anterior view of the ileum, vermiform appendix, cæcum and ascending colon. The meso-appendix is typical in attachments and of quadrilateral outline. The ileum is left *in situ* to illustrate its relations to the meso-appendix.



A.—The Meso-Appendix, with the Ileum in Situ

Figure 5

FIGURE 6.—SECOND TYPE OF MESO-APPENDIX.

From a male aged 2. Posterior view of the ileum, cæcum, vermiform appendix and ascending colon. The base of the meso-appendix is here attached to the left layer of the enteric mesentery and posterior surface of the ascending colon for a distance of 1.3 cm. The vermiform appendix shows the spiral twisting so common in infants and young children.

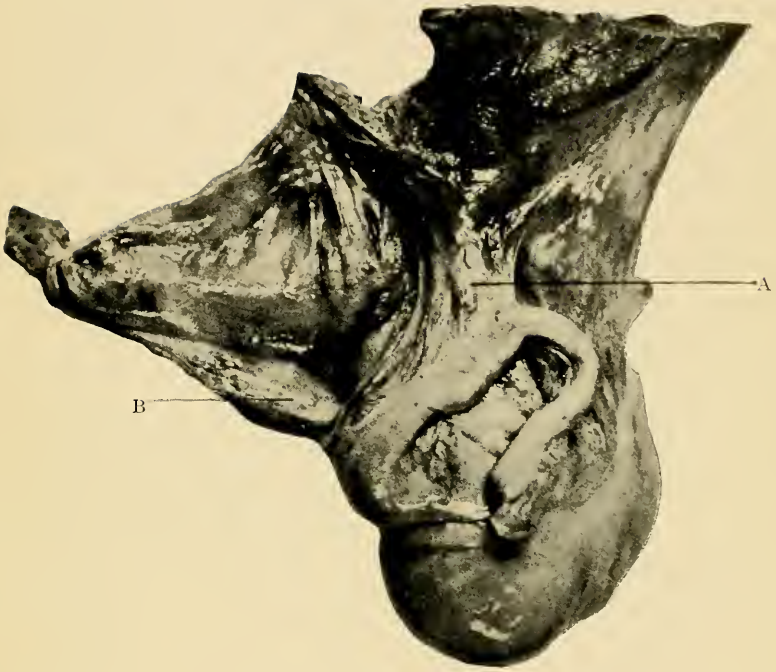
Figure 6

A.—The Meso-Appendix. Second Type

FIGURE 7.—THIRD TYPE OF MESO-APPENDIX.

From a male aged 47. Posterior view of the ileum, cæcum, vermiform appendix and ascending colon. The meso-appendix is here situated entirely behind the colon. Its base is attached to the posterior surface of the ascending colon for a distance of 3.1 cm.

Figure 7

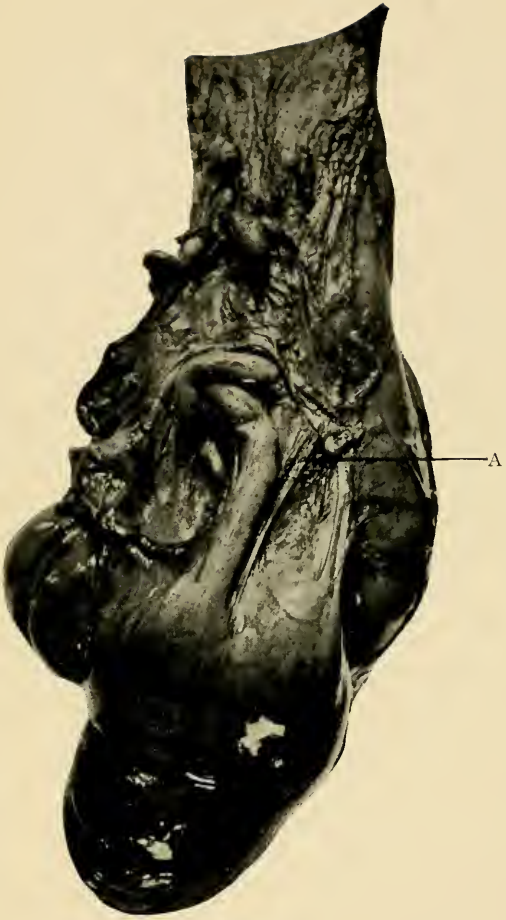


A.—The Meso-Appendix. Third Type
B.—The Ileo-Cæcal Fold

FIGURE 8.—FOURTH TYPE OF MESO-APPENDIX.

From a male aged 20. Posterior view of the cæcum, vermiform appendix and ascending colon. The meso-appendix is here entirely behind the ascending colon, is much shortened and its attachments are not definable. The vermiform appendix is long, measuring 11.5 cm. and lies entirely behind the ascending colon.

Figure 8



A.—The Meso-Appendix. Fourth Type

FIGURE 9.—FIFTH TYPE OF MESO-APPENDIX.

From a male aged 26. Posterior view of the ileum, cæcum, vermiform appendix and ascending colon. The vermiform appendix is almost entirely adherent to the colon and the meso-appendix is reduced to a small fold of peritoneum near the apex of the appendix.

Figure 9

A.—The Meso-Appendix. Fifth Type

FIGURE 10.—SIXTH TYPE OF MESO-APPENDIX.

From a female aged 45. Posterior view of the ileum, cæcum, vermiform appendix and ascending colon. The meso-appendix is represented only by the peritoneum binding the colon and appendix together. The vermiform appendix is here retro-colic in position.

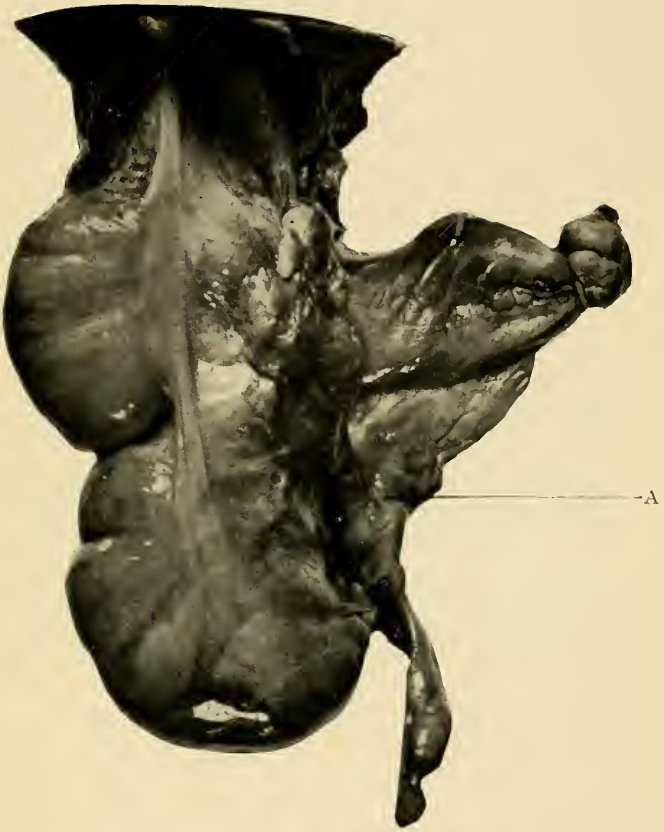
Figure 10

Meso-Appendix. Sixth Type

FIGURE 11.—ABNORMAL MESO-APPENDIX.

From a female aged 47. Anterior view of the ileum, cæcum, vermiform appendix and ascending colon. The meso-appendix is here represented by, and occupies the position of the ileo-cæcal fold. Its base is attached to the lower border of the ileum for a distance of 4.4 cm.

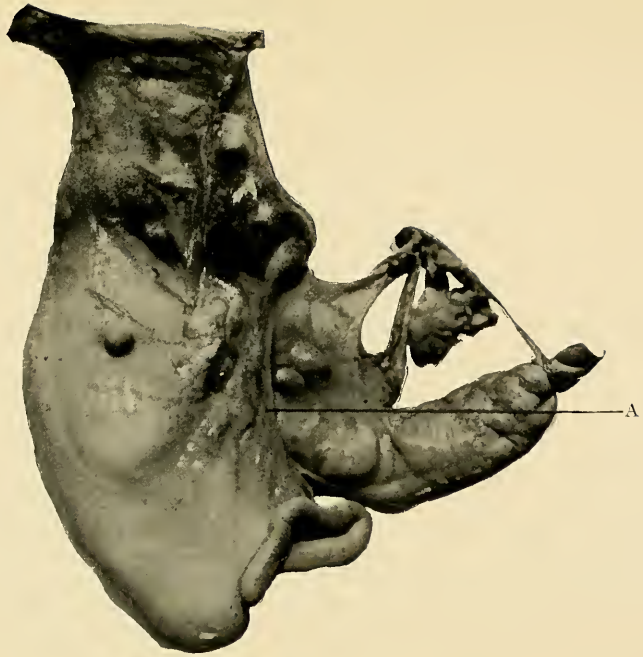
Figure 11



A.—Abnormal Meso-Appendix, represented by the Ileo-Cæcal Fold

FIGURE 12.—ABNORMAL MESO-APPENDIX.

From a male aged 2. Anterior view of the ileum, cæcum, vermiform appendix and ascending colon. The meso-appendix is represented by an ileo-colic fold, just internal to which are some enlarged appendicular glands.

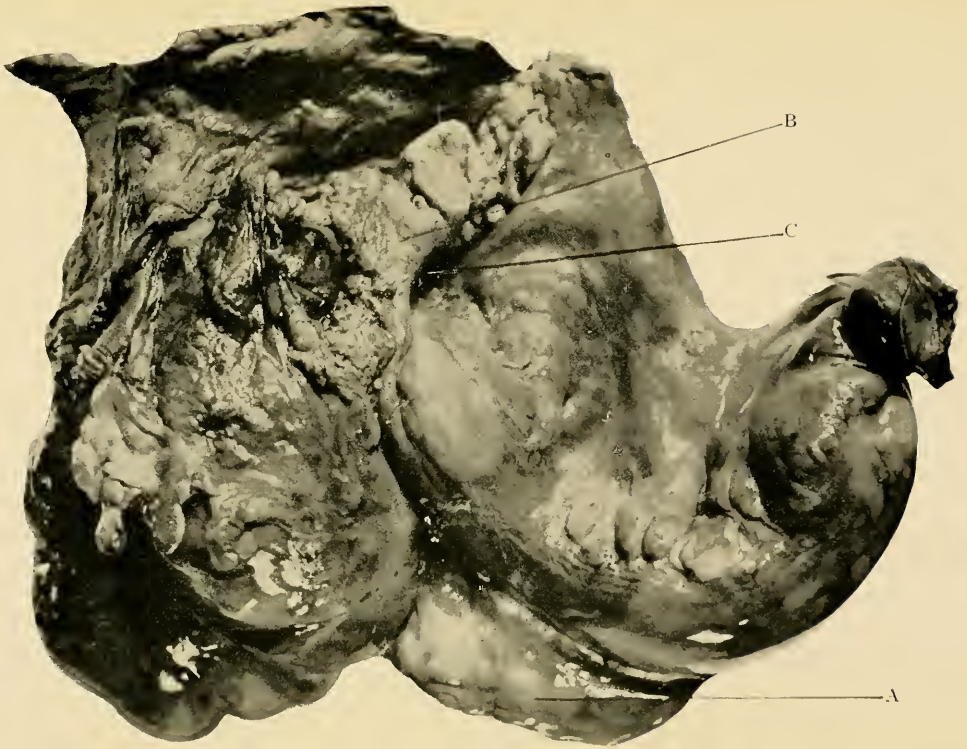


A.—Abnormal Meso-Appendix, represented by the Ileo-Colic Fold

Figure 12

FIGURE 13.—THE ILEO-CÆCAL FOLD.

From a male aged 40. Anterior view of the ileum, cæcum and ascending colon. The ileo-cæcal fold is large, fatty and vascular. Its superior border extends along the ileum for a distance of 6.3 cm. It has no connection with the meso-appendix, consequently there is no ileo-cæcal fossa. The ileo-colic fold is also large and fatty and there is a well marked ileo-colic fossa.



A.—The Ileo-Cæcal Fold. B.—The Ileo-Colic Fold. C.—The Ileo-Colic Fossa

Figure 13

FIGURE 14.—ABSENCE OF THE ILEO-CÆCAL FOLD.

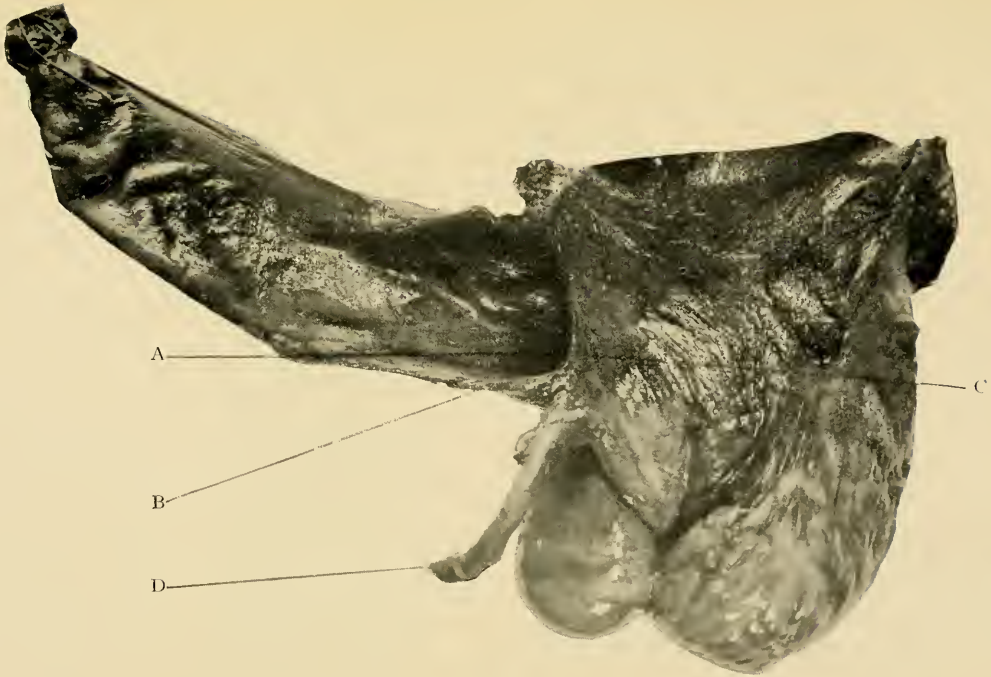
From a female aged 3. Anterior view of the ileum, cæcum and ascending colon. There is no trace of the ileo-cæcal fold. The ileo-colic fold is small but there is a well defined ileo-colic fossa, capable of admitting the tip of the little finger.

Figure 14

Absence of the Ileo-Cæcal Fold

FIGURE 15.—ILEO-CÆCAL FOSSA.

From a male aged 35. Posterior view of the ileum, cæcum, vermiform appendix and ascending colon. There is a well marked ileo-cæcal fossa bounded in front by the enteric mesentery, posterior surface of the ileum and the ileo-cæcal fold; behind, by the meso-appendix. This fossa is large and is capable of admitting the terminal phalanges of two digits. The vermiform appendix may be herniated into it. The cæcum in this instance belongs to the second type of cæca as described by Treves.



A.—The Ileo-Cæcal Fossa
B.—The Ileo-Cæcal Fold
C.—The Meso-Appendix
D.—The Vermiform Appendix

Figure 15

FIGURE 16.—LYMPHOID TISSUE IN THE CÆCUM OF A PIGEON.

A longitudinal section through the cæcum of a pigeon illustrating the large amount of lymphoid tissue and the presence of germ centres in that part of the intestine.

FIGURE 17.—CÆCUM AND INTESTINE OF A PIGEON.

A longitudinal section through the cæcum and adjacent intestine of a pigeon showing the large amount of lymphoid tissue in the cæcum (to the left) and the relative absence of lymphoid tissue in the remainder of the large intestine (to the right).

Figure 16

VERTICAL SECTION OF THE CÆCUM OF A PIGEON

Figure 17

VERTICAL SECTION OF THE INTESTINE AND CÆCUM OF A PIGEON